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IS 12012 (1992): Gas taps with or without flame failure device for domestic and commercial gas burning appliances [MED 23: Domestic and Commercial Gas Burning Appliances]



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“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक

घरेलू और व्यवसायिक द्रवित पेट्रोलियम गैस दाहन
साथियों के लिये लौ-विहीनता युक्ति सहित अथवा रहित
गैस टैप — विशिष्ट

(पहला पुनरीक्षण)

Indian Standard

GAS TAPS WITH OR WITHOUT FLAME
FAILURE DEVICE FOR DOMESTIC AND
COMMERCIAL LIQUEFIED PETROLEUM GAS
BURNING APPLIANCES — SPECIFICATION

(*First Revision*)

UDC 621.646.6 : 641.534.2 : 683.945 : 665.725

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BUREAU OF INDIAN STANDARDS
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FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Domestic and Commercial Gas Burning Appliances Sectional Committee had been approved by the Heavy Mechanical Engineering Division Council.

This standard was originally issued in 1987. This revision is being undertaken to incorporate the requirements of flame failure device when it is a part of the gas tap.

This standard is one of a series of Indian Standards on various domestic and commercial gas burning appliances (pressure type) used with LPG. General requirements of this product are covered in IS 5116 : 1985 'General requirements for domestic and commercial equipment for use with LPG (*second revision*)' which is a necessary adjunct to this standard. Should, however any deviation exists between the requirements given in IS 5116 : 1985 and those of this standard, provisions of the latter shall apply.

The tests in this standard are not intended to cover the effects excessive of temperature that may arise through faulty operation of an appliance.

Notwithstanding the requirements given in this standard, any new design, materials and methods or assembly shall be examined for compliance with manufacture's claims and may be considered acceptable if they give results at least equivalent to those specified in this standard.

In preparing this standard, assistance has been derived from BS 5494 : 1978 'Specification for gas tap for domestic and catering appliances' issued by British Standards Institution.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

GAS TAPS WITH OR WITHOUT FLAME FAILURE DEVICE FOR DOMESTIC AND COMMERCIAL LIQUEFIED PETROLEUM GAS BURNING APPLIANCES — SPECIFICATION

(*First Revision*)

1 SCOPE

This standard covers requirements for design, materials, and performance of gas taps 'With or without flame failure device' (including pilot taps) of nominal inlet size not exceeding 20 mm and intended for use with domestic and commercial appliances operating on LPG.

2 REFERENCES

The Indian Standards listed in Annex A are necessary adjuncts to this standard.

3 DEFINITIONS

3.1 For the purpose of this standard, the following definitions, in addition to those given in IS 6480 : 1988 shall apply.

3.2 Axial Tap

A tap in which one or more pistons or valves move axially to open and close ports.

3.3 Disc Tap

A tap which is operated by rotating a disc, having one or more ports or channels, against a flat surface containing one or more ports or channels.

3.4 Lineal Seal

The distance measured along the sealing surface of a tap in which the closure member rotates.

3.5 Nominal Flow Rate

The air flow rate at a specified pressure loss as claimed by the manufacturer.

3.6 Plug Tap

A tap which operated by rotating a taper plug is a mating bore.

3.7 Safety Latch

A device which self locks the tap in the positive stop position and requires a different action to move the tap into the control mode.

3.8 Poppet Valve

A valve in which the seal is achieved by the axial movement of a closing member against a sealing face substantially at right-angles to the direction of the axial movement.

3.9 Heat Sensing Device

A device which senses the heat such as thermocouple.

3.10 Solenoid

For the purpose of this standard, solenoid is a device which shuts off the gas outlet passage mechanically or electrically, until unless operated manually.

4 OPERATIONAL DATA

4.1 The manufacturer shall declare the following:

- a) The working temperature range for which the tap has been designed.
- b) The nominal flow rate at full 'ON' position (*see* Fig. 1).
- c) The service suitability number (*see* 13), and
- d) For multi-outlet taps, whether the tap is suitable for supplying burner ports in more than one combustion chamber.
- e) For gas taps with flame failure device the method of fitting the sensing devices with the burner head.

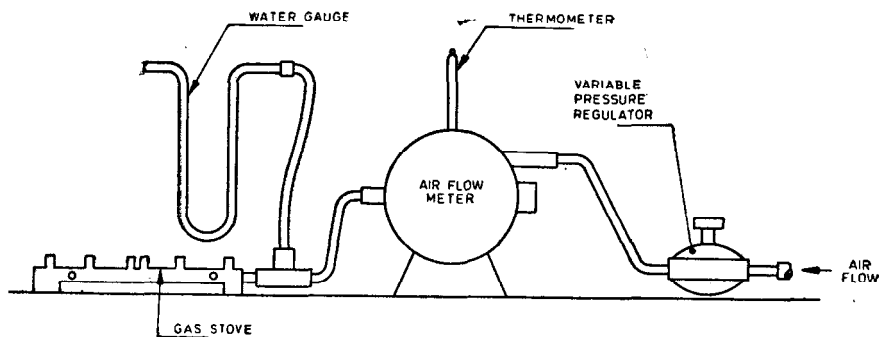


FIG. 1 TEST SET-UP FOR FLOW RATE

5 GENERAL REQUIREMENTS

5.1 The relevant requirements given in 3 to 17 of section 1 of IS 5116 : 1985 shall apply.

5.2 The tap shall not leak during the normal usage. The tap shall be suitable for L.P. gas.

5.3 The tap shall be so made that in normal use the gas passage do not become blocked.

5.4 The tap shall be capable of operating smoothly over the temperature range for which it is designed and quoted by the manufacturer.

5.5 All components effecting safety and durability shall be of sound quality and free from burrs, dirt or foreign matter which could adversely affect the operation of the tap.

5.6 Where a means of ignition is incorporated, the tap shall be sufficiently robust to prevent distortion or damage in performing this additional operation.

5.7 Taper plug type taps shall have a taper of not less than 1 in 6 on diameter for spring loaded taps. The operative diameter at the top of plug shall be not greater than the axial length of taper in contact with the body.

5.8 The taper plug at the larger diameter shall be recessed into the body and the plug shall protrude beyond the taper of the body at the small end. There shall be adequate clearance provided for this protrusion.

5.9 For multi-outlet taps, where the tap has two or more gas passages and the manufacturer specifies that these are only to be connected to burner ports in a single combustion chamber, specified gas tap position should have an independent gas passage through the gas tap

linking the gas tap to a single combustion chamber without interference by any other gas passage in the same tap through lineal/circumferential seal.

5.10 Niting (connecting) components or tap shall be sufficiently robust to avoid damage or distortion in normal use.

5.11 Every taper plug or disc type tap for L. P. gas shall be spring loaded to maintain a gas type fit at all times including during operation.

5.12 When a tap is set to any specific position it shall remain in that position.

5.13 When a knob is supplied, the method of transmission of the torque from the knob to the tap spindle shall not depend on any spring clip/screw which is intended solely for retaining purposes.

5.14 Non-functional holes, used for manufacture of the tap, that form a passage between gasways and the atmosphere shall be permanently sealed by mechanical means.

5.15 Where taps are intended to be dismantled for servicing, for example, re-lubrication, where shall be ready access to the closing member, for example, plug-disc, and the design of the parts that have to be removed in the servicing operation shall not permit incorrect assembly.

5.16 When the tap becomes the part of the appliance, which is subject of another standard, and/or fitted with additional components, additional design features recommended to ensure compatibility with the requirement of this standard are given in Annex B.

5.17 The gas taps with flame failure device shall meet the requirements given in 5.17.1

and 5.17.2 in addition to requirements given in 13 of IS 5116 : 1985.

5.17.1 Flame failure device may have provision for by passing. Temporary by pass using manual operation at the time of ignition is permitted.

5.17.2 Relative position of the burner, ignition and flame sensing device shall be such that, in the event of shortening, distortion or blockage of igniting jet or other part of ignition system, the supply of gas to the burner shall be cut off.

6 MATERIAL

6.1 Materials that constitute the body of the tap, excluding the seals and other internal parts and the knob shall not melt at temperature up to 425°C. Examples of suitable materials given in Annex C are guidance only.

NOTE — For a plug tap the body includes the plug.

6.2 Zinc alloys shall be used only if:

- a) they comply with all the requirements of IS 742 : 1981.
- b) the casting is manufactured in accordance with the recommendation of IS 1655 : 1968.
- c) the parts are not to be subjected to a temperature higher than 80°C.
- d) they meet the requirements of 6.1.

6.2.1 For gas carrying parts and parts which could affect the safe operation of the valve only alloy ZnAl₄ of IS 742 : 1981 shall be used.

6.3 Where organic sealing materials, including impregnating agents and synthetic rubber, are likely to come into contact with the gas, the tap or organic components shall comply with the requirements 6.3.2.

6.3.1 Diaphragms, if used, shall comply with the requirements given in 6.3.2.1.

6.3.2 All non-metallic materials shall show no marked deterioration when subjected to an accelerated ageing test for (see 11.5) seven days at a temperature of 20°C in excess of the manufacturer's maximum recommended temperature.

NOTE — The above requirements may not be met by materials made of some silicon rubbers although these rubbers are claimed to be satisfactory. Criteria for testing silicone rubber materials are still under consideration and, in the meantime, components and appliances containing such a material will be considered acceptable provided that the appropriate manufacturer can demonstrate that they have proved satisfactory in use.

6.3.2.1 A diaphragm, if used, shall not pull out or burst when the outlet of the assembled tap is subjected to an air pressure of $3 \times 10^5 \text{ N/m}^2$ (2.7 kgf/cm²).

6.4 Flame sensing device in the gas tap with flame failure device shall not distort or melt during continuous use of 4 hours.

7 SPRINGS

Where springs are used to retain plugs, discs, pistons or valves on their seatings they shall be protected against corrosion and against any deleterious effects arising from the working environment.

8 CONNECTIONS

Where taps are provided with threaded-connections, those connections shall meet the requirements of IS 5116 : 1985 and IS 4246 : 1992.

9 GAS SOUNDNESS

9.1 The gas tap shall be tested for gas soundness by the method given in 9.1.1.

9.1.1 Subject the gas tap to be tested to an air supply at a pressure of 150 gf/cm² with the bubble leak indicator (see Fig. 2) in the air supply line. Apply this pressure with the tap closed and examine the bubble indicator for the appearance of bubbles. The interval between successive bubbles passing through it shall not be less than 10 seconds. Repeat the test with the jet sealed and the tap opened. Repeat the two tests after the tap has been turned 'ON' and 'OFF' ten times.

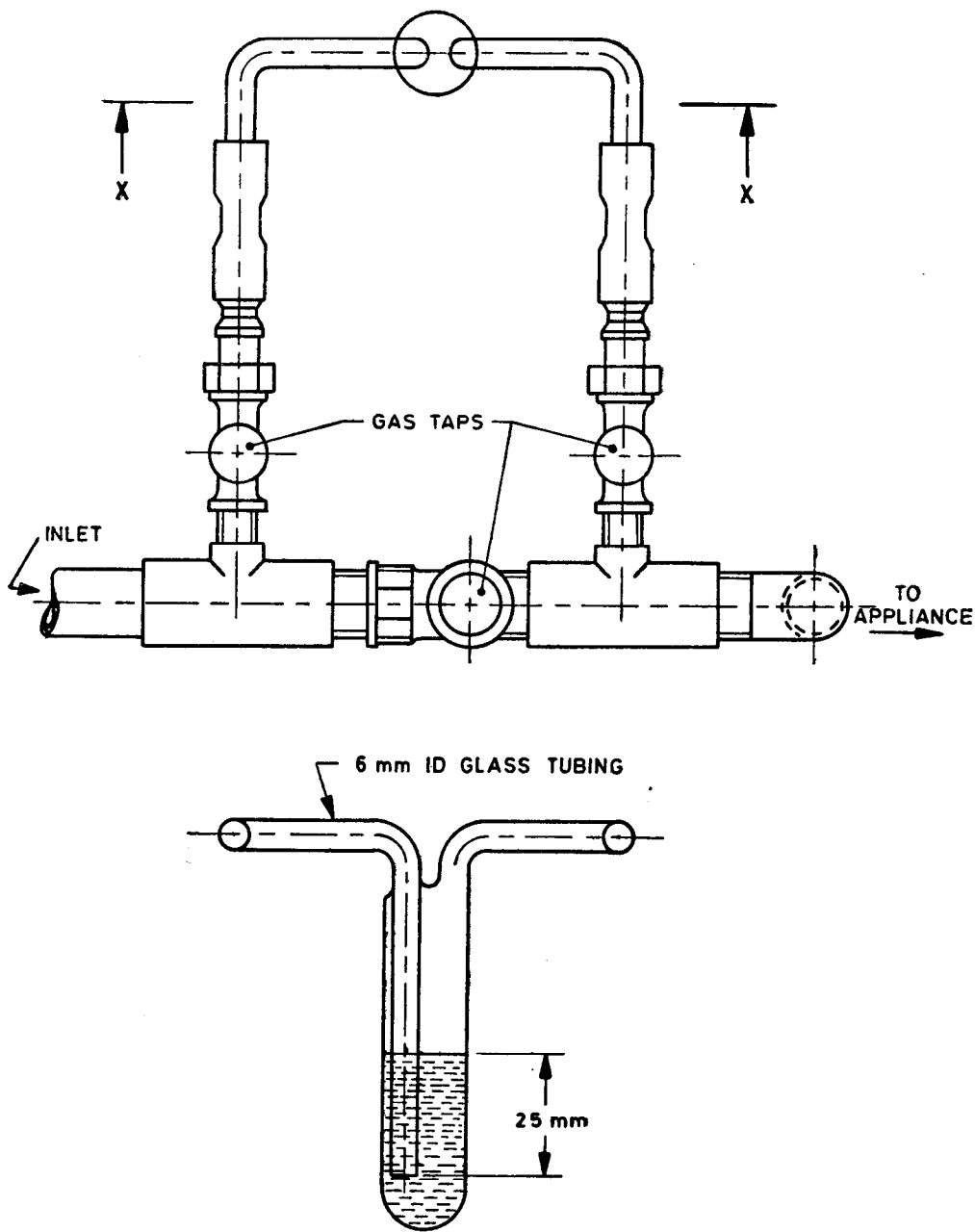
9.2 The method given in 9.2.1 shall be used to locate the point of leakage.

9.2.1 Immerse the gas tap to be tested in a waterbath at room temperature. Then connect it to an air supply at a pressure of 150 gf/cm² for a minimum period of 10 seconds with the tap closed. The tap shall be examined for leakage of air. The test shall be repeated with jet sealed and tap opened. The two tests shall be repeated after the tap has been turned 'OFF' and 'ON' ten times. The interval between successive bubbles passing through it shall not be less than 10 seconds.

10 MECHANICAL PERFORMANCE TEST

10.1 Safety Latch

The tap shall not unlock from 'OFF' position when a torque of 4 Nm is applied. The performance of the tap shall not be permanently impaired by this torque.



SECTION XX

FIG. 2 BUBBLE LEAK INDICATOR

10.2 Mechanical Strength

The tap shall be of sufficient mechanical strength to resist the stresses and conditions of normal use. A tap that satisfies the requirements of the torque and bending moment tests, given in 10.2.1 and 10.2.2 respectively, and thereafter remains functional without exceeding the leakage rates given in 9 and without showing signs of distortion and cracking shall be deemed to have sufficient mechanical strength.

10.2.1 Torque Test

10.2.1.1 Gas tap with threaded female inlet and outlet — Threaded pipe at least 300 mm in length shall be screwed hand tight to the inlet and outlet of the tap and the inlet pipe shall be clamped. The test torque (see Table 1) shall be applied to the outlet pipe for approximately 10 seconds. The outlet pipe shall be clamped and the test torque shall be applied to the inlet pipe for approximately 10 seconds. The tap shall not show any deformation and leakage after the test.

10.2.1.2 Gas tap with male threaded inlet or female threaded inlet — Threaded pipe of at least 300 mm in length shall be screwed hand tight to the inlet and the body is clamped. The test torque covered in Table 1 shall be applied to the inlet pipe for approximately 10 seconds. The tap shall not show any deformation and leakage after the test.

Table 1 Torque and Bending Moment

(Clauses 10.2.1.1, 10.2.1.2, 10.2.1.3, 10.2.1.5 and 10.2.2)

Nominal Inlet Size mm	Torque Nm	Bending Moment Nm
4	10	15
6	15	25
8	20	35
10	35	70
15	50	105
20	85	225
25	125	340

10.2.1.3 Olive compression connections — Use a steel tube with a new brass olive of the recommended size, apply the torque (see Table 1) to the nut and proceed as in 10.2.1.1 above. Discount any deformation on the olive seating or matting surfaces consistent with the torque applied.

10.2.1.4 Flanged connections — Clamp the flanged connection in the normal manner, apply the torque to the opposite connection and proceed as in 10.2.1.1 above.

10.2.1.5 Threaded outlet for injectors — Select a torque from Table 1 for a thread size (by major diameter) at least as large as the injector thread equivalent to a particular nominal inlet size. Apply this torque to the injector for 10 seconds. Check the tap for deformation and leakage.

10.2.2 Bending Moment Test (Applicable to Threaded Connections only)

Following the torque test given in 10.2.1 either the inlet pipe is clamped within 5 D of the connection boss, where D is the nominal diameter of the pipe, or the flanged connection is clamped in the normal manner. A force equivalent to the bending moment (see Table 1) shall be applied to the outlet connection. This force shall be applied either to the outlet pipe used in 10.2.1 or to a suitable flanged pipe which is clamped to the flanged outlet connection in the normal manner. The force shall be applied for approximately 10 seconds in each of four directions perpendicular to each other and to the axis of the pipe.

10.2.2.1 Clamp the outlet pipe and apply the test force to the inlet pipe. Check the tap for deformation and leakage.

11 ENDURANCE TEST

11.1 Requirement

Two taps shall be subjected to an endurance test comprising a cycling test and a subsequent static test according to the procedures given in 11.2, 11.3 and 11.4.

11.2 General Conditions of Test

11.2.1 The taps shall be tested with air at a pressure of 2.942 to 3.432 kN/m² (30 to 35 gf/cm²).

11.2.2 The taps shall be tested in a chamber which can be heated and cooled to the required temperatures within 15 to 20 minutes.

11.2.3 The tapes shall not be regreased during the test.

11.3 Cycling Test

11.3.1 Definition

For the purpose of these tests a 'cycle' consists of OFF-ON-OFF operation, that is, starting

from the closed position (but unlocked), whereby the tap is turned (or operated) at specified rate of movement to the end of its travel and back at the same rate of movement to the closed position without locking or retaining a pressure against the stop.

11.3.2 Conditions

The rate of movement of the operating member shall be between 1.5 rad/s and 2.6 rad/s irrespective of the total angular movement for rotary operation, or approximately 10 mm/s for axial operation.

11.3.2.1 In a multi-station test rig, adjustment for variation in angular or linear movement between taps shall be available. Where continued supervision is not available for the test, it is advisable to incorporate friction clutch or other device to cut out any particular tap if, and when, the maximum torque or axial force is exceeded.

11.3.2.2 Alternatively the test may be carried out manually using reliable counting device.

11.3.3 Procedure

The tests shall be carried out for periods alternately at the working temperature of 80°C and at ambient temperature. Each period shall consist of the number of cycles according to the 'service suitability number' (*see* 13) stated in Table 2 and the test shall continue until completion of the total number of cycle required or the tap fails.

Table 2 Endurance Test Cycles

Service Suitability Number	Number of Cycles for Each Period at		Total Number of Cycles
	Maximum Temperature	Ambient Temperature	
1	(5 h ON)	50	300
2	Nil	300	300
3	1 000	1 000	3 000
4	1 200	1 200	6 000
5	2 000	2 000	10 000
6	2 000	2 000	20 000

11.4 Static Test

On completion of the cycling test, the taps shall be heated for period of 2 hours at the maximum working temperature in the ON position. After this the tap shall satisfy the requirements of 9.

11.5 Accelerated Ageing Test

The tap shall be maintained at a temperature of 10°C above the maximum working temperature with the inlet and outlet ports open to atmosphere for a period of 4 weeks. The tap shall meet the requirements of 5.4, 11.2, 11.3 and 11.4 after this period. Accelerated Ageing Test shall be type test (design approval).

12 TEST FOR FLAME FAILURE DEVICE

12.1 Requirements for the flame failure device shall be as under:

- Shall cut off gas to the main burner if the flame is not established.
- May be actuated manually or by ignition system, if provided, to ignite the main burner or pilot without failure or delay.
- Shall open and close in time not exceeding the followings:

Operation	Time	
	Manually operated, Seconds	Non-manually operated Seconds
Opening from cold	10	90
Closing from the fully heated condition	60	90

12.2 The flame failure device shall be tested by the method given in Annex D.

13 SERVICE SUITABILITY NUMBER

The service suitability number of a tap designates the degree of severity of service for which the tap is intended. Typical service applications corresponding to the six service suitability numbers are given in Table 3.

Table 3 Service Suitability Numbers

Service Suitability	Average Rate of Usage	Examples of Application
1	Up to 30 per year	Pilot (domestic)
2	Up to 30 per year	Refrigerator
3	6 operations per week	Drying cabinet, hot cupboard, oven, wash boiler
4	12 operations per week	Pilot (catering) space heater
5	20 operations per week	Grill
6	60 operations per week	Hotplate

14 FINISH

Where a finish coating is applied, it shall comply with the requirements in the appropriate appliance standard. Adequate precautions shall be taken to ensure that any form of coating shall not impair the safety and performance of the tap.

15 MARKING

15.1 Each tap shall be clearly and permanently marked with the manufacturer's name or identification mark.

15.1.1 Certification Marking

Details available with the Bureau of Indian Standards.

ANNEX A

(Clause 2)

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
319 : 1989	Free-cutting brass bars, rods and sections—Specification (<i>fourth revision</i>)	4246 : 1992	Domestic gas stoves for use with liquefied petroleum gases—Specification (<i>fourth revision</i>)
410 : 1977	Specification for cold rolled brass sheet, strip and foil (<i>third revision</i>)	4454 (Part 4) : 1975	Specification for steel wires for cold formed spring : Part 4
617 : 1975	Specification for aluminium and aluminium alloys ingots and castings for general engineering purposes (<i>second revision</i>)	5116 : 1985	Stainless spring steel wire for normal corrosion resistance (<i>first revision</i>)
742 : 1981	Specification for zinc base alloy die castings (<i>second revision</i>)	6480 : 1988	General requirements for domestic and commercial equipment for use with LPG (<i>second revision</i>)
1264 : 1989	Brass gravity diecasting ingots and castings—Specification (<i>third revision</i>)	6912 : 1985	Glossary of terms relating to domestic and commercial gas burning appliances (<i>first revision</i>)
1655 : 1968	Code of practice of manufacture of zinc alloy pressure die casting (<i>first revision</i>)	7608 : 1987	Specification for copper and copper alloys forging stock and forgings (<i>first revision</i>)
2501 : 1985	Specification for copper tubes for general engineering purposes (<i>second revision</i>)		Specification for phosphor bronze wires for general engineering purposes (<i>first revision</i>)

ANNEX B

(Clause 5.16)

RECOMMENDED REQUIREMENTS FOR TAP APPLICATION**B-1 KNOB**

B-1.1 The knob shall only be able to be replaced in the correct position.

B-1.2 The knob shall have a minimum length of positive engagement of 6 mm with the 'D' Section or other engagement of the spindle. The engagement shall not depend upon any retaining spring clip used solely for retaining purposes.

B-1.3 The knob shall withstand a minimum hand applied torque of 3 Nm without damage.

B-2 TAP

B-2.1 The effect of light-back, faulty door seals, etc, should be considered (*see* Foreword for the effects of excessive temperature that may arise through faulty operation of an appliance).

ANNEX C

(Clause 6.1)

MATERIALS

Examples of suitable materials are specified below:	Alloy CZ 121	Nuts, etc—Type I of IS 319 : 1989
Alloy LM 6, LM 20	Bodies—Alloy 4600 and 4600 of IS 617 : 1975	Alloy PB 102, PB 103
Alloy DCB 1	Bodies (die castings)—DCB 1 of IS 1264 : 1989	Alloy En 56 series
Alloy DCB 3	Bodies (pressure die castings)—DCB 2 of IS 1264 : 1989	Alloy C 106, C 107
Alloy CZ 122	Bodies, plugs (hot pressed)—Leaded Brass of IS 6912 : 1985	Alloy CZ 108
		Tubes—Grade DHP and DPA of IS 2501 : 1985
		Washers—Alloy CuZn37 of IS 410 : 1977
		Springs (phosphour bronze)—Grade I and II of IS 7608 : 1987
		Springs (stainless steel)—Grade 1 of IS 4454 (Part 4) : 1975

ANNEX D

(Clause 12)

METHOD OF TEST FOR FLAME FAILURE DEVICE

D-1 The following equipments are required for the test:

- a) A device having a burner and arrangement for fitting the gas tap (to control the gas supply to the burner). The burner shall also have arrangement for fixing the heat sensing device with burner head;
- b) Pilot burner with igniting jet having provision of fitting the heat sensing device and to be fitted with main burner head.
- c) LPG cylinder with regulator and rubber tube;
- d) Stop watch; and
- e) Igniting device.

D-2 Gas tap and heat sensing device shall be fitted with device given in **D-1** (a) according to the recommendation of the manufacturer. Switch on gas tap and allow gas supply to the tap. Hold the igniting device [refer **D-1** (e)] near burner head and ignite the burner by operating the device of the gas tap as per manufacturer's recommendation. When burner is ignited start the stop watch. Release the device after 10 seconds and watch the flame. The flame shall not extinguish.

D-3 The flame shall be brought to simmer position by operating the gas tap. Watch the

flame for 5 minutes and the flame shall not extinguish.

D-4 Allow the burner to operate at "FULL ON" for 30 minutes. Extinguish the flame and start stop watch. Immediately after 60 seconds the burner shall not get ignited without operating the device manually.

D-5 For burner with pilot flame provision the pilot burner with igniting jet shall be fitted as per manufacturer recommendation.

D-5.1 Opening

With the appliance cold and the main gas turned off, turn on and ignite the pilot jet. Turn on the main burner tap or taps and water taps, if necessary. Note the time required from ignition of the pilot for the gas in the main burner to ignite.

D-5.2 Extinguish the pilot flame (where heat sensing device is fitted). The flame of the main burner should extinguish automatically (due to cut-off of gas supply) within 90 seconds.

D-6 After the flame failure and the device is preventing the gas to the main burner (while the gas cock is at "FULL ON" position) the total gas leakage shall not exceed 1.5 l/h at standard pressure.

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